

Chapter

2

Assessing Cumulative Environmental
Effects of Oil Sands Projects

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Office of the Auditor General of Canada
240 Sparks Street, Stop 1047D
Ottawa, Ontario
K1A 0G6

Telephone: 613-952-0213, ext. 5000, or 1-888-761-5953

Fax: 613-943-5485

Hearing impaired only TTY: 613-954-8042

Email: distribution@oag-bvg.gc.ca

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Assessing Cumulative Environmental Effects of Oil Sands Projects

Main Points

What we examined

Project-based environmental assessment is used to predict the adverse environmental effects of a project before it is carried out and to identify measures to mitigate those effects. Under the *Canadian Environmental Assessment Act*, projects must undergo environmental assessment when a federal department or agency (referred to as a responsible authority) has decision-making authority or is the project proponent, regulator, land manager, or funding source. Eligible projects include the construction, operation, modification, decommissioning, or abandonment of a physical work, or other physical activities specified by regulation.

The Act further requires that the environmental assessment of each project under review consider cumulative environmental effects. The cumulative environmental effects of a project are environmental effects arising from a single project under review, combined with the effects of other projects or activities located in the same geographic region. The assessment of multiple-project environmental effects combines the environmental effects of projects that have been in operation for years or decades, the projected environmental effects of the specific project under review, and the potential environmental effects of projects that have not yet begun operation but will do so in the future. While the environmental effects of a single project may not be significant when assessed in isolation, the combined effects of multiple projects on water, air, land, and wildlife may have significant adverse environmental effects.

We examined whether the federal government has considered cumulative environmental effects of major oil sands projects in northern Alberta, in accordance with the environmental assessment process established by the Act. This examination included the role of selected federal entities in the environmental assessment process, along with their submissions and other actions related to their participation in joint review panels. The oil sands region of northern Alberta was selected because of the high concentration of major projects that are operating or planned in the area, where the potential for cumulative effects could be significant. We did not audit the roles

of the independent joint review panels and the provincial government in the environmental assessment of oil sands projects, or those of regional organizations that monitor and report on cumulative environmental effects in the region.

Audit work for this chapter was substantially completed on 30 April 2011.

Why it's important

Considering cumulative environmental effects as part of the environmental assessment process is important to protect the environment in areas where multiple large-scale projects operate or are planned. Assessing cumulative effects requires information on potentially affected ecosystems, including baseline information and the carrying capacity of given terrestrial and aquatic ecosystems, so that federal authorities can appropriately analyze the environmental effects of a project in relation to other projects. Failure to predict cumulative environmental effects and incorporate appropriate mitigation measures into the design and implementation of a project before the project is constructed can lead to significant environmental degradation as well as increased costs.

What we found

- Incomplete environmental baselines and environmental data monitoring systems needed to understand changing environmental conditions in northern Alberta have hindered the ability of Fisheries and Oceans Canada and Environment Canada to consider in a thorough and systematic manner the cumulative environmental effects of oil sands projects in that region.
- Fisheries and Oceans Canada, Environment Canada, and the Canadian Environmental Assessment Agency did not adapt the terms of reference for subsequent environmental assessments as a means of reducing gaps in the information needed to fully consider changing environmental conditions.
- In September 2010, the government established the Oil Sands Advisory Panel, whose mandate was to document, review, and assess the current body of scientific research and monitoring in the northern Alberta oil sands region and, in December 2010, the Panel issued its report. In response, the federal government committed to establish, with its key partners, a world-class environmental monitoring system for the lower Athabasca River basin.

The Agency has responded. The Agency agrees with our recommendations. Its detailed responses follow the recommendations in the chapter.

Introduction

Oil sands and bitumen—Generally a mixture of bitumen, sand, and clay. Bitumen is a naturally occurring viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, bitumen is not recoverable at a commercial rate through a well because it is too thick to flow. It must either be mined or extracted by processes that generally involve heating the sand and the oil it contains to enable it to flow.

The oil sands region of northern Alberta

2.1 Northern Alberta is the location of the second-largest known oil reserve in the world, the **oil sands**, which cover an area of approximately 140,000 square kilometres. Development of this natural resource began in 1967, using two methods of extracting the oil. Surface mining is generally used where the **bitumen** is within 75 metres of the surface. This is the case for deposits around Fort McMurray, which represents about three percent of the total oil sands area. Underground mining, commonly referred to as in situ or steam-assisted gravity drainage, is used to extract deeper bitumen.

2.2 As of January 2011, there were five surface mining projects in production within the surface mineable area (Exhibit 2.1). One additional project was under construction and four more have been proposed. A number of underground mining projects have also been planned for this area; one of these was already in production in January and several others were in various stages of planning, construction, or pre-operation. In terms of barrels of oil per day, the industry predicts that total oil sands production from surface and underground sources combined will more than double within the next 15 years. Given the potential impact of such major extraction projects on the environment, the provincial and federal governments normally require that these projects undergo an environmental assessment before they can proceed.

Environmental assessment of projects

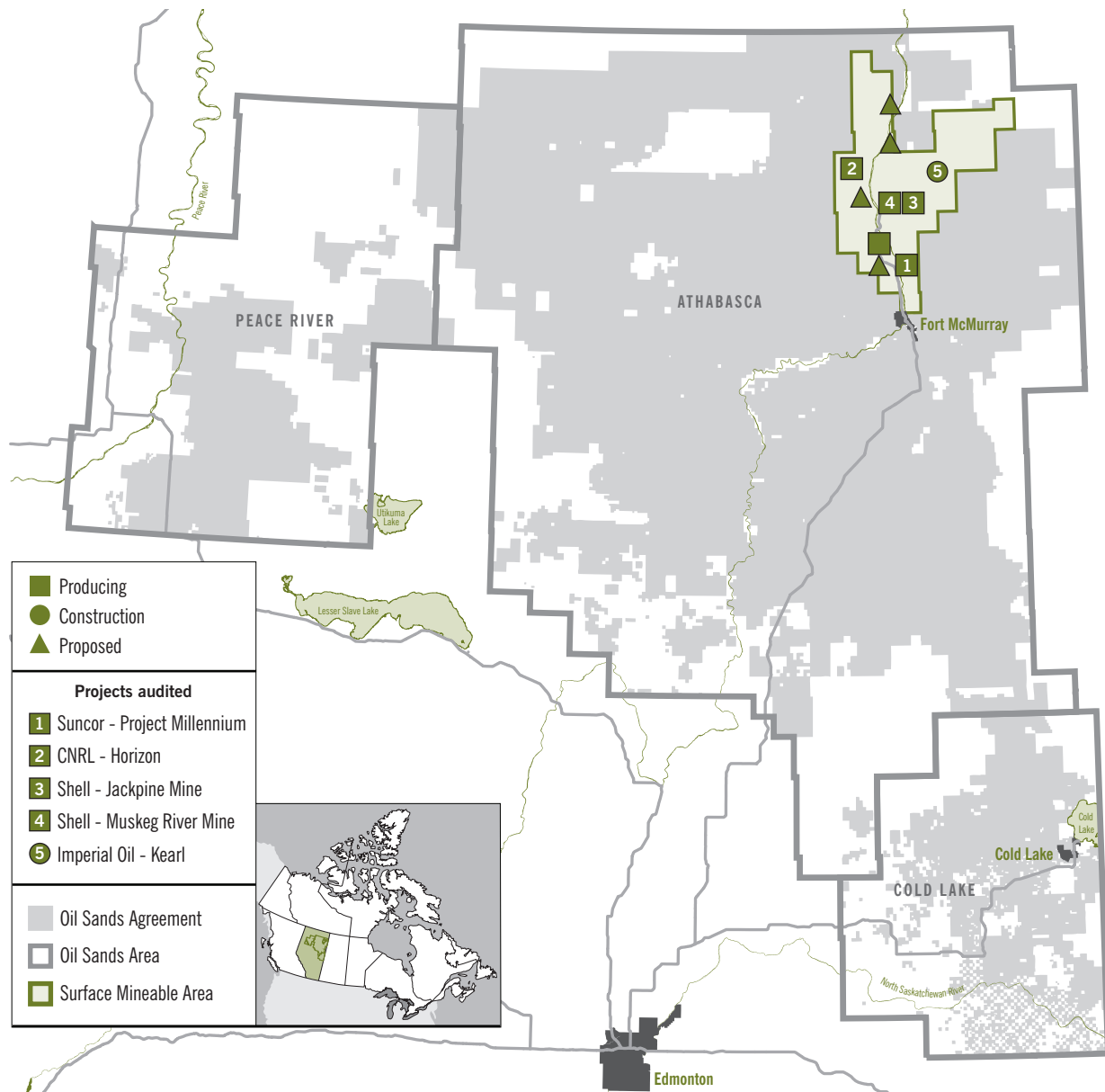
2.3 Under the Constitution, the federal and provincial governments share responsibility for protecting the environment. Provinces have primary jurisdiction over natural resource sectors, such as forestry, mining, and hydroelectric development. The federal government is responsible for fisheries, shipping, interprovincial trade and commerce, and criminal law. It also has residual powers related to areas not specifically assigned to the provinces.

2.4 At the federal level, the preamble to the *Canadian Environmental Assessment Act* (the Act) states that “environmental assessment provides an effective means of integrating environmental factors into planning and decision-making processes in a manner that promotes sustainable development.” Section 4(1)(a) of the Act states that one of its purposes is “to ensure that projects are considered in a careful and

precautionary manner before federal authorities take action in connection with them, in order to ensure that such projects do not cause significant environmental effects.”

2.5 The federal environmental assessment process begins when the need for an environmental assessment is identified under the *Canadian Environmental Assessment Act*. Section 5(1) of the Act requires an environmental assessment to be carried out when a federal department

Exhibit 2.1 The oil sands cover a large area of northern Alberta



Source: Alberta's Oil Sands Projects and Upgraders—Alberta Energy

Project—The construction, operation, modification, decommissioning, or abandonment of a physical work, or other physical activities specified by regulation.

Proponent—The person or organization that proposes the project.

Comprehensive study—An environmental assessment used for large-scale or complex projects likely to have significant effects on the environment, that may generate public concerns, and that are subject to the Comprehensive Study List Regulations under the *Canadian Environmental Assessment Act*.

is involved in a **project** as project **proponent**, regulator, land manager, or funding source. Before exercising its powers in relation to a project, the responsible authority must ensure that the environmental assessment is performed and that it takes into account the significance of all harmful or undesirable effects on the environment that are expected to remain after proposed mitigation measures are put into place. There are three types of environmental assessments in use—screenings, comprehensive studies, and review panels. The large-scale oil sands projects considered in our audit were subject to either a federal–provincial joint review panel of independent experts or a **comprehensive study**. Environmental assessments are carried out in a series of interrelated phases:

- scoping,
- analyzing,
- identifying mitigation measures,
- evaluating the significance of effects, and
- following up.

Cooperation agreements, such as the Canada–Alberta Agreement on Environmental Assessment Cooperation, govern situations where provinces also need to carry out an environmental assessment. Exhibit 2.2 describes roles and responsibilities for cooperative environmental assessments.

Cumulative environmental effects

2.6 A project-based environmental assessment identifies the potential effects of a particular project on the environment. Since the environmental effects are rarely isolated from those of adjacent projects or activities, the Act requires that the assessment consider the project’s incremental impact on these cumulative or combined effects.

2.7 While the Act requires federal authorities (Exhibit 2.2) to consider cumulative environmental effects, it does not define the term. Two publications of the Canadian Environmental Assessment Agency provide guidance for federal departments on assessing cumulative effects: the 1999 Cumulative Effects Assessment Practitioners’ Guide and the 1994 reference guide Addressing Cumulative Environmental Effects. The Practitioners’ Guide describes how these effects can be considered for each phase of an environmental assessment. It also identifies ways in which they can occur, including

- physical-chemical transport—through air emissions, waste water, and sediment;
- nibbling loss—gradual disturbance and loss of land and habitat;
- spatial and temporal crowding—many projects carried out within too small an area and in too brief a period of time; and
- growth-inducing potential—current actions that bring about further actions.

2.8 This guidance underscores the complex nature of cumulative environmental effects based on the interaction of many factors, often over long periods of time.

2.9 Some federal authorities have issued their own guidance to supplement that of the Agency. For example, in 2001, Fisheries and Oceans Canada introduced its CEEA Guide—Applying the *Canadian Environmental Assessment Act* for the Fish Habitat Management Program, which described the steps for conducting an environmental assessment, including departmental roles and responsibilities. Environment Canada plans to include a section on considering cumulative environmental effects in its updated internal environmental assessment guidance.

Roles and responsibilities

2.10 Multiple federal and provincial bodies share roles and responsibilities for the environmental assessments of major oil sands projects (Exhibit 2.2). Federal departments and agencies are involved throughout the environmental assessment process, including in situations where a project is referred to a review panel. Federal responsibilities include contributing to the setting of **terms of reference** for proponents to prepare an environmental impact statement, reviewing and analyzing that statement, and providing input into assessment reports produced by either the responsible authority or a federal–provincial joint review panel.

2.11 Other federal acts set out additional responsibilities for ongoing monitoring and assessment of environmental effects. These responsibilities complement and potentially support the environmental information and assessment requirements under the *Canadian Environmental Assessment Act*. Section 4 of the federal *Department of the Environment Act* states that the Minister of the Environment is responsible for the preservation and enhancement of the quality of the natural environment, including water, air, and soil quality. The minister is also responsible for coordinating the policies and programs

Terms of reference—A document that outlines the requirements for information needed for an environmental assessment.

of the Government of Canada for preserving and enhancing the quality of the natural environment. Further, Section 44 of the *Canadian Environmental Protection Act, 1999* requires the Minister of the Environment to establish, operate, and maintain “a system for monitoring environmental quality.” According to the Act, “environment” means the components of the Earth, and environmental quality includes the health of ecosystems.

Exhibit 2.2 Environmental assessments of major oil sands projects are a cooperative federal–provincial undertaking

Organization	Role and responsibilities
Under the Canada–Alberta Agreement on Environmental Assessment Cooperation:	
Lead party (Alberta Environment for most oil sands projects)	<ul style="list-style-type: none"> • Issues the terms of reference for the proponent (with input from the other party) and ensures that the environmental information needs of the other party are met. • Coordinates requests to proponents for additional information.
Other party (Federal government for most oil sands projects — coordinated by the Canadian Environmental Assessment Agency)	<ul style="list-style-type: none"> • Contributes to the terms of reference for the proponent and confirms to the lead party that the terms of reference meet its requirements. • Reviews and comments on the proponent’s environmental impact statement requesting additional information where necessary.
Proponent	<ul style="list-style-type: none"> • Prepares the environmental impact statement according to the terms of reference and submits it to federal and provincial authorities, providing additional information when requested.
Under the <i>Canadian Environmental Assessment Act</i>:	
Canadian Environmental Assessment Agency	<ul style="list-style-type: none"> • Administers the <i>Canadian Environmental Assessment Act</i>. • Promotes high-quality assessment through training and guidance and provides administrative and advisory support. • As of July 2010, ensures that an environmental assessment is conducted for a comprehensive study, except for those instances where the Canadian Nuclear Safety Commission or the National Energy Board are responsible authorities.
Responsible authority (Fisheries and Oceans Canada for all of the oil sands projects selected for this audit. Transport Canada was not included in the scope of this audit but was also a responsible authority for one of the selected oil sands projects.)	<ul style="list-style-type: none"> • Ensures that an environmental assessment of a project is conducted as early as possible. As of July 2010, the Canadian Environmental Assessment Agency has assumed this responsibility for most comprehensive studies. • Exercises power or performs a duty or function (for example, issuing a <i>Fisheries Act</i> authorization for the harmful alteration, disruption, or destruction of fish habitat) only after the assessment is completed and where the project is not likely to cause significant adverse environmental effects, or where, if such effects are likely, they can be justified in the circumstances. If such effects cannot be justified, the power, function, or duty is not carried out. • Participates in joint review panels as an expert department for a project. • Issues regulatory approval or authorization.

Exhibit 2.2 Environmental assessments of major oil sands projects are a cooperative federal–provincial undertaking (continued)

Organization	Role and responsibilities
<p>Federal authorities (Environment Canada for all of the oil sands projects selected for this audit. Natural Resources Canada, Health Canada, Parks Canada, and Indian and Northern Affairs Canada were not included in the scope of this audit but were also federal authorities for some or all of the selected oil sands projects.)</p>	<ul style="list-style-type: none"> Participate in the environmental assessment process, including joint review panels or comprehensive studies, as expert departments for a project.
<p>Joint review panels (Created by the federal and provincial governments and consist of independent panel members. Responsible authorities recommend the creation of a review panel for projects with likely adverse environmental effects or where public concerns may warrant it.)</p>	<ul style="list-style-type: none"> Impartially and objectively review and assess the environmental effects of a project. Hold public hearings, and summarize and report on their assessment of the project, including cumulative environmental effects, and present recommendations to proponents and government.
<p>Other organizations</p>	
<p>Regional organizations (Organizations whose members include federal and provincial governments, proponents, and other stakeholders — Exhibit 2.4)</p>	<ul style="list-style-type: none"> Develop frameworks, and monitor and report on environmental effects in the oil sands region.

Sources: Canadian Environmental Assessment Agency website ("About the Agency"), *Canadian Environmental Assessment Act*, Canada–Alberta Agreement on Environmental Assessment Cooperation

Focus of the audit

2.12 The objective of the audit was to determine whether the federal government has considered the cumulative environmental effects of major oil sands projects in northern Alberta according to the *Canadian Environmental Assessment Act*.

2.13 We examined the federal government’s role in assessing large-scale oil sands projects in northern Alberta that were subject to either a joint review panel or a comprehensive study under the *Canadian Environmental Assessment Act* (Exhibit 2.3). In particular, we examined whether the federal government has considered the cumulative environmental effects of projects in the oil sands region of northern

Alberta in discharging its responsibilities. We looked at the roles of selected federal organizations in the environmental assessment process, including

- their review and analysis of environmental information, and
- their submissions and other actions for their participation in joint review panels and for comprehensive studies.

2.14 We selected the oil sands region of northern Alberta because the number of environmental assessments of large projects carried out there is among the highest in Canada. We focused on the work of Fisheries and Oceans Canada (as a responsible authority), Environment Canada (as a key expert federal authority), and the Canadian Environmental Assessment Agency (as the federal administrator of environmental assessment activities). We did not audit the roles of the independent joint review panels, the provincial government, or regional organizations. We also did not audit the underlying scientific evidence used by federal authorities to support their deliberations, analyses, submissions, and reports.

Exhibit 2.3 Five large oil sands projects in northern Alberta underwent environmental assessments from 1999–2007

Date of assessment	Project name	Type of assessment
1999	Project Millennium	Comprehensive study
2004	Horizon Oil Sands Project	Joint review panel
2004	Jackpine Mine Project	Joint review panel
2006	Muskeg River Mine Expansion	Joint review panel
2007	Kearl Oil Sands Project	Joint review panel

Source: Canadian Environmental Assessment Agency

2.15 More details about the audit objective, scope, approach, and criteria are in **About the Audit** at the end of this chapter.

Observations and Recommendations

Information for assessing cumulative environmental effects

Baseline data—A description of existing environmental, social, or economic conditions at and surrounding a project or area.

Carrying capacity—The maximum level of use or activity that an ecosystem can sustain without negative consequences. Carrying capacity is generally determined by scientific analysis.

Information gaps hinder the analysis of cumulative environmental effects

2.16 As part of our audit, we examined whether Fisheries and Oceans Canada and Environment Canada had adequate information to consider the cumulative environmental effects of the development of oil sands projects in northern Alberta. To assess the cumulative effects of a project, federal authorities need environmental data and scientific information regarding potentially affected ecosystems—for example, **baseline data** and information on **carrying capacity**. The departments need to be able to review and analyze a project proponent’s environmental impact statement, and to contribute to assessment reports produced by either the responsible authority or a joint review panel. As stated in Fisheries and Oceans Canada’s CEAA Guide—Applying the *Canadian Environmental Assessment Act* for the Fish Habitat Management Program, its officials are to get information from proponents on the existing environment of the area under study. In addition, the proponent’s environmental impact statement must identify potential environmental effects—including cumulative effects—and their significance.

2.17 As part of our audit, we looked to see whether the government had the information needed for assessing environmental impact statements. We also examined whether the federal government had reviewed the adequacy of information provided to joint panels established to review and assess the environmental impacts of proposed oil sands projects.

2.18 Environmental impact statements reviewed before creation of a joint review panel. We found that, for the projects we examined, Fisheries and Oceans Canada and Environment Canada reviewed the proponents’ environmental impact statements in the two- to three-year period from the time the federal environmental assessment was triggered and a responsible authority was identified up to the creation of a joint review panel. They did so according to their responsibilities under the Canada–Alberta Agreement on Environmental Assessment Cooperation. This work is an important part of the federal environmental assessment process. Environmental impact statements are based on federally reviewed terms of reference and provide key information for the preparation of a comprehensive study or for use by subsequent joint review panels. The federal authorities’ review of the environmental impact statements repeatedly identified information gaps and raised concerns about the assumptions and models used to

predict environmental effects of the projects. Often, federal authorities requested further information or clarification from the proponents, which they then reviewed and analyzed.

2.19 Information gaps and concerns raised in submissions to joint review panels. We found that, once a joint review panel was in place, federal authorities prepared submissions for the joint review panel public hearings. Between 1999 and 2007, these submissions, as well as those for the comprehensive study carried out on the 1999 Project Millennium, repeatedly pointed to gaps in environmental data and scientific information related to the potential cumulative impact of oil sands projects on water quantity and quality, fish and fish habitat, land and wildlife, and air. Federal officials told us that the responsibility for collecting environmental information is shared by the federal and provincial government, which creates a challenge for assessment of cumulative effects.

2.20 Areas of concern raised by federal authorities included, for example, insufficient information on the potential **acidification** of water bodies in northern Saskatchewan; a lack of baseline data for assessing the impact of projects on wildlife corridors; and uncertainties and incomplete information regarding the impacts of stream flow rates, **tailings**, and other water issues, such as the potential impact of **polycyclic aromatic hydrocarbons** extending as far as Great Slave Lake.

2.21 Specific concerns federal authorities raised in some key areas include the following:

- **Water quantity.** At the time of the 1999 comprehensive study on Project Millennium, the oil sands water monitoring program was in its early stages. As a result, the study could not yet assess the effects on stream flow in the region. In 2004, Fisheries and Oceans Canada expressed concerns about the modeled versus actual water flow predictions due to incomplete baseline information and doubts about the models used. In 2006, Environment Canada raised concerns about ongoing scientific uncertainties and data gaps related to stream flows, while Fisheries and Oceans Canada noted that it lacked sufficient information about water withdrawals to assess the cumulative effects of projects. In response to the 2004 Horizon and Jackpine joint review panel reports, Fisheries and Oceans Canada and Alberta Environment subsequently produced a water management framework regarding **stream flows and water withdrawals** from the lower Athabasca River. The framework is intended to guide regulators in their decision making regarding

Acidification—Build-up of excess sulphuric and nitric acids in the soil, waters, and air.

Tailings—A by-product of mining operations that is discharged and contained in large earthen structures above ground (tailings ponds) or in former mine pits awaiting reclamation.

Polycyclic aromatic hydrocarbons—Environmental contaminants that are formed when combustion of organic materials, such as wood or fossil fuels, is incomplete. These hydrocarbons are found in crude oil and products such as bitumen, asphalt, coal tar pitch volatiles, and unrefined or mildly refined mineral oils.

Stream flows and water withdrawals—The flow of water in streams, rivers, and other channels. Successful feeding, migration, rearing, and overwintering of fish species depend on sufficient stream flows (the in-stream flow needs). Withdrawal of water during natural low-flow conditions in a river is of concern due to the potential for water levels to drop below the in-stream flow needs.

the cumulative effects of withdrawing water. Phase 1 was carried out in 2007 and Phase 2 was scheduled to have been carried out in January 2011, but Fisheries and Oceans Canada officials informed us that the revised target for completion of the Phase 2 framework document is early 2012.

Fish tainting—Abnormal odour or flavour in fish.

- **Water quality.** In 2004, Environment Canada noted deficiencies in baseline information as well as data gaps in on-site water quality sampling. That same year, Fisheries and Oceans Canada noted that the impact of water quality on local fish populations was poorly understood, in particular **fish tainting** and overall fish health. Further, Fisheries and Oceans Canada flagged the risk of possible seepage of tailings ponds (containing oil sands by-products) into Jackpine Creek as well as overall uncertainties about whether the water quality in end-pit lakes—engineered lakes to be created in mined-out pits—could be high enough to produce viable ecosystems. In 2006, Environment Canada raised concerns about the limited number of under-ice water quality samples taken.
- **Fish and fish habitat.** The 1999 comprehensive study report noted the lack of baseline information on invertebrates in the region and on their contribution to the condition of fish habitat. In 2004, Fisheries and Oceans Canada raised similar concerns about aquatic species information as well as the cumulative environmental effects of projects on fish and fish habitat due to successive water withdrawals and the elimination of some watercourses. In 2006 and 2007, the Department noted further lack of data on fish habitat and uncertainties about ways to compensate for lost habitat. Fisheries and Oceans Canada reported that it had difficulty getting a clear picture of fish populations at the regional level due to a lack of data, a lack of reference areas and sites, the limited number of years used to gather information, and changes in sampling.
- **Land and wildlife.** In 1999, Environment Canada noted that wildlife populations and wildlife movements were poorly understood, while the potential impact of the oil sands on biodiversity was unknown. That same year, Environment Canada recommended creating a comprehensive monitoring program to develop baseline data to determine the effects of oil sands projects on wildlife and biodiversity. Five years later, Environment Canada found that the lack of information about the characteristics of wildlife migration within boreal forests remained. Besides gaps in baseline information, Environment Canada also noted that the

absence of regional information continued to hamper assessments. In 2006 and 2007, the Department found the proponent was unable to complete a regional cumulative effects assessment for old growth forests and bird populations because of incomplete regional habitat mapping.

- **Air.** The 1999 comprehensive study report noted that provincial trans-boundary effects of projects were not addressed because of the absence of in-depth analysis. At the same time, Environment Canada stated that available data suggested that some environmental limits for air emissions in the area would be exceeded.

2.22 Through their submissions to joint review panels, Fisheries and Oceans Canada and Environment Canada outlined their concerns about the completeness and uncertainty of environmental data and the implications for understanding fully the cumulative environmental effects in the region.

Cooperative efforts have not resulted in closing information gaps

2.23 The 2003 amendments to the *Canadian Environmental Assessment Act* encouraged federal authorities to cooperate with provinces and other bodies in regional studies while meeting their obligations under the Act. Joint review panels have also underscored the importance of partnerships between federal authorities and regional organizations. Since the late 1990s, several regional organizations, working groups, and strategies in the oil sands region of northern Alberta have been created, with the objective of monitoring cumulative environmental effects of development in the region (Exhibit 2.4). Federal authorities participate in those regional initiatives.

2.24 Federal authorities maintained membership in these regional organizations with an expectation that these cooperative efforts would reduce identified information gaps, improve scientific understanding, and disseminate environmental data. For example, we noted that in its report for Project Millennium, Fisheries and Oceans Canada referred to the Government of Alberta's Regional Sustainable Development Strategy and the Regional Aquatics Monitoring Program as initiatives to reduce identified information gaps.

2.25 We found that while the federal government continued to work with regional organizations, government departments acknowledged that gaps in the information needed to consider cumulative environmental effects still remained. For example, in 2004, Environment Canada noted that the rate of oil sands project

development was potentially exceeding the ability of the Cumulative Environmental Management Association (CEMA) and the Regional Sustainable Development Strategy to introduce effective management systems to set environmental thresholds or objectives. Similarly, the joint review panel for the 2007 Kearn Oil Sands Project stated that while the success of CEMA is critical, ultimately, government regulators are responsible for managing environmental effects in the region.

Exhibit 2.4 Federal authorities have participated in regional initiatives to monitor and report on cumulative environmental effects

Term	Description
Regional Sustainable Development Strategy (RSDS)	<ul style="list-style-type: none"> • RSDS was created by the Government of Alberta in 1999 to deal with the question of whether the environment could handle the level of projected growth in oil and gas activities in the region. • It identified and prioritized 72 environmental issues within the oil sands region that should be studied in light of the projected growth. The issues were divided into a list of 14 themes and 3 priority categories (information gaps and urgency; information gaps and work under way; and information gaps, work under way, and lower level of urgency). • Federal RSDS partners included Environment Canada and the Canadian Environmental Assessment Agency.
Cumulative Environmental Management Association (CEMA)	<ul style="list-style-type: none"> • CEMA is a multi-stakeholder group created in 2000 to deal with 37 of the issues identified by the RSDS. • It provides recommendations to regulators on managing potential cumulative environmental effects using an array of environmental management tools, such as environmental limits or thresholds. • Federal members participate in working groups. Members include the Canadian Environmental Assessment Agency, Environment Canada, Fisheries and Oceans Canada, Health Canada, Natural Resources Canada, and Parks Canada.
Regional Aquatics Monitoring Program (RAMP)	<ul style="list-style-type: none"> • RAMP is an industry-funded, multi-stakeholder environmental monitoring program started in 1997. • It integrates aquatic monitoring activities across different components of the aquatic environment, different geographical locations, oils sands projects, and other developments in the Athabasca oil sands region. The aim is to make it possible to identify and address long-term trends, regional issues, and potential cumulative effects related to oil sands projects and other development. • It monitors aquatic environments in the Athabasca oil sands region to detect and assess cumulative effects and regional trends. It collects baseline data, collects and compares data against which predictions appearing in environmental impact assessments can be assessed, and collects data that satisfies the monitoring requirements set as conditions in regulatory approvals of oil sands projects and other developments. • Federal members of the steering committee are Environment Canada, Fisheries and Oceans Canada, and Health Canada.

Source: Alberta Environment, CEMA and RAMP websites

Terms of reference for environmental assessments do not make use of past experience

2.26 As part of our audit, we examined whether Fisheries and Oceans Canada, Environment Canada, and the Canadian Environmental Assessment Agency had established terms and conditions in the early planning phase of environmental assessments to guide the assessment of the cumulative environmental effects associated with the development of oil sands projects in northern Alberta.

2.27 The *Canadian Environmental Assessment Act* requires responsible federal authorities to determine the scope and factors to be considered for an environmental assessment. In the case of cooperative environmental assessments of oil sands projects, the Canada–Alberta Agreement on Environmental Assessment Cooperation sets out the roles and responsibilities for preparing the terms of reference to proponents (Exhibit 2.2).

2.28 The terms of reference to proponents are important because they outline the information the federal government requires the project proponent to provide in its environmental impact statement. This information is meant to allow the federal government to fully consider the cumulative effects associated with the development of the oil sands projects. The proponent’s environmental impact statement is also a key source of information for the joint review panels. We examined whether the federal authorities had provided clear input to the development of the terms of reference and had confirmed that they could meet their needs. We also examined whether federal authorities would monitor the results of a cumulative effects assessment to consider whether, in fact, the terms of reference for that assessment actually did meet their needs or whether they should be modified for subsequent assessments of cumulative environmental effects.

2.29 We found that the Canadian Environmental Assessment Agency, Fisheries and Oceans Canada, Environment Canada, and other federal departments gave comments and suggestions on the terms of reference document before it was issued by the lead party. In the case of the Project Millennium comprehensive study, Fisheries and Oceans Canada—the federal responsible authority—confirmed that the terms of reference met the federal requirements under the Act. However, while federal authorities commented on the draft terms of reference for the four projects referred to a joint review panel, the federal government did not confirm, as required by the Canada–Alberta Agreement on Environmental Assessment Cooperation, that the final terms of reference met federal requirements. In some cases,

Environment Canada notified the Canadian Environmental Assessment Agency that the final terms of reference did not incorporate its comments, including its information requirements for assessing cumulative effects. We were not provided evidence that the Agency resolved Environment Canada's concerns, for example, by issuing supplemental terms of reference as allowed by the Canada–Alberta Agreement.

2.30 We also found that the terms of reference issued to proponents of oil sands projects from 1999 to 2007 were generic and did not change from one project assessment to the next. For the five projects we reviewed, the federal government did not take the opportunity to modify terms of reference in later projects to deal with key concerns previously raised by federal authorities, in areas such as water quantity and quality, fish and fish habitat, land and wildlife, and air. In our opinion, federal authorities should have used the sound management practice of adapting terms of reference over time in order to address identified gaps in information being provided to them.

2.31 Recommendation. The Canadian Environmental Assessment Agency should assess lessons learned from previous cumulative environmental effects assessments of oil sands projects to identify good practices. These lessons learned should serve as a basis for adjusting terms of reference to proponents for future assessments of cumulative effects.

The Agency's response. Agreed. The Agency has already initiated improvements in the development of the terms of reference to proponents. This includes working with the provinces and other departments to ensure that the terms of reference to proponents take into account experience gained from previous environmental assessments. The Agency will continue to apply this approach for future projects as it strives to provide Canadians with world-class environmental assessments.

2.32 Recommendation. The Canadian Environmental Assessment Agency should review and update its guidance, including its 1999 Cumulative Effects Assessment Practitioners Guide, to take into account recent practices within Canada, including lessons learned from past assessments, as well as lessons from elsewhere regarding assessments of cumulative environmental effects.

The Agency's response. Agreed. The Agency will review its practitioner's guidance to ensure that it reflects best practices in cumulative effects assessment from Canada and around the world.

The review will focus on recent knowledge, making use of both practitioners' experience and relevant findings from research studies. Developed for use by government and private sector practitioners, the Agency guidance will support the assessment of cumulative effects under the *Canadian Environmental Assessment Act*.

Departments responded to an environmental petition concerning northern Alberta oil sands projects

Environmental petition—A process created in 1995 through an amendment to the *Auditor General Act*. It is a formal, yet simple, way for Canadians to get responses from federal ministers to their questions, concerns, and requests on environmental issues that are within the federal government's mandate. More information is available at www.oag-bvg.gc.ca/petitions_e.

2.33 As part of our audit, we reviewed the current status of government actions taken in response to an **environmental petition** received concerning the oil sands projects of northern Alberta. We wanted to see whether the departments had made further progress since the petition was received.

2.34 We found that in 2008, the federal government responded to an environmental petition that asked for the status of the federal government's response to joint review panel recommendations for oil sands projects. In response to the petitioner's concern about recommendations calling for additional monitoring, the government said it was "following up with the proponent to ensure compliance" with respect to some of the monitoring reports required by conditions of *Fisheries Act* authorizations for the harmful alteration, disruption, or destruction of fish habitat issued in 2004 for the Horizon Oil Sands Project. In summer 2010, Fisheries and Oceans Canada officials told us that the reports had been received and were being reviewed.

Recent federal government initiatives

2.35 Subsequent to the period covered by the audit, in September 2010, the federal government created an Oil Sands Advisory Panel on water monitoring for the lower Athabasca River basin and connected waterways. Its mandate was to

- document, review, and assess the current body of scientific research and monitoring; and
- identify strengths and weaknesses in the scientific monitoring, and the reasons for them.

2.36 In December 2010, the Panel reported the results of its work. It found that Canadians lacked a first-class, state-of-the-art monitoring system in the oil sands region. The Panel observed that, despite the myriad programs ongoing in the oil sands region, there was no evidence of science leadership to ensure that monitoring and research activities were planned and performed in a coordinated way, and no evidence that the vast quantities of data were analyzed and interpreted in an integrated manner. Similarly, the Panel found there

was a lack of leadership on reporting on oil sands environmental performance across environmental components, such as water, air, and land.

2.37 However, the Panel found that, with the level of research, monitoring, and environmental assessment data that has been collected, and with the commitment of stakeholders, current activities could be transformed into a system providing credible data for decisions. It said that such a system would allow Canadians to know the current conditions and trends in the oil sands ecosystem and would encourage the necessary foresight to prevent environmental degradation.

2.38 The Panel recommended that concerned jurisdictions and stakeholders together develop a shared national vision and management framework with aligned priorities, policies, and programs. It said that the basis of the vision and management framework would include an approach that is holistic and integrated, adaptive, scientifically credible, transparent, and accessible.

2.39 In March 2011, the federal government unveiled Phase I of its plan for a world-class system for monitoring surface water quality. The federal government acknowledged that the current monitoring approach was fragmented, inconsistent, and lacking in integration. In its plan, the government concluded that monitoring activities “did not deliver data of sufficient quantity or quality to detect or quantify the effects of oil sands development” and therefore, “strategic decisions for environmental protection (including water quality) and industry sustainability cannot be made under such conditions.”

2.40 The federal government has committed itself, with its partners, to improving the monitoring system in several integrated phases. In Phase 1, the plan identifies a specific number of water monitoring stations to be located between Fort McMurray and the Peace–Athabasca Delta to obtain a better understanding of physical and chemical stressors affecting the system and improving knowledge of baseline conditions. Phase 2 will identify key biological and ecological indicators to be monitored and used to assess local and regional impacts, including cumulative effects.

Conclusion

2.41 We have concluded that incomplete environmental baselines and environmental data monitoring systems needed to understand changing environmental conditions in northern Alberta have hindered the ability of Fisheries and Oceans Canada and Environment Canada to consider in a thorough and systematic manner the cumulative environmental effects of oil sands projects in that region.

2.42 We are encouraged by the government's commitments in response to the work of the Oil Sands Advisory Panel. We will monitor the government's progress in putting into effect monitoring systems in keeping with the principles set out by the Panel.

About the Audit

All of the audit work in this chapter was conducted according to the standards for assurance engagements set by The Canadian Institute of Chartered Accountants. While the Office adopts these standards as the minimum requirement for our audits, we also draw upon the standards and practices of other disciplines.

Objective

The objective of our audit was to determine whether the federal government (primarily Fisheries and Oceans Canada as a responsible authority, Environment Canada as a federal authority with expert knowledge, and the Canadian Environmental Assessment Agency as the federal administrator of environmental assessment activities) has considered the cumulative environmental effects of major oil sands projects in northern Alberta under the *Canadian Environmental Assessment Act*.

Scope and approach

We examined the federal government's assessments of cumulative environmental effects carried out for all of the oil sands projects in northern Alberta that were subjected to either a comprehensive study or a joint review panel and where the environmental assessment process had been completed. Our examination included determining whether the federal government had put in place the necessary processes to support the analysis of cumulative environmental effects. The projects we examined were Project Millennium (1999 comprehensive study), the Horizon Oil Sands Project (2004 joint review panel), the Jackpine Mine Project (2004 joint review panel), the Muskeg River Mine Expansion (2006 joint review panel), and the Kearl Oil Sands Project (2007 joint review panel).

We did not audit the roles of the independent joint review panels and the provincial government, or those of regional organizations that monitor and report on cumulative environmental effects in the region.

Our work consisted of reviewing documentation from the federal government's assessment of cumulative environmental effects for the projects examined, supplemented with interviews with headquarters and regional officials responsible for the assessment of the selected projects. We did not audit the underlying scientific evidence used by federal authorities to support their deliberations, analysis, submissions, and reports.

Additional interviews were carried out with those responsible for coordinating environmental assessment within each organization as well as with departmental experts in water, fish habitat, air, and other related environmental issues, as required. Third-party and stakeholder interviews were also carried out as required.

We also reviewed the federal government's 2008 response to environmental petition 263, which asked federal departments about the status of recommendations in the reports of oil sands joint review panels.

Criteria

To determine whether federal authorities have considered the cumulative environmental effects of major oil sands projects in northern Alberta according to the <i>Canadian Environmental Assessment Act</i> , we used the following criteria:	
Criteria	Sources
The selected organizations assess the cumulative environmental effects of selected large resource-based projects, and their significance, according to the requirements of the <i>Canadian Environmental Assessment Act</i> and related policies, regulations, and guidance.	<ul style="list-style-type: none"> • <i>Canadian Environmental Assessment Act</i>, section 16(1) (a) and (b) and section 16.2 • Operational Policy Statement on Addressing Cumulative Effects under the <i>Canadian Environmental Assessment Act</i>, Canadian Environmental Assessment Agency, updated 2007 • Cumulative Effects Assessment Practitioners Guide, Canadian Environmental Assessment Agency, 1999 • A Reference Guide for the <i>Canadian Environmental Assessment Act: Addressing Cumulative Environmental Effects</i>, Canadian Environmental Assessment Agency, 1994 • Cabinet Directive on Implementing the <i>Canadian Environmental Assessment Act</i>, 2005 • Canada–Alberta Agreement on Environmental Assessment Cooperation, 1999 and 2005

Management reviewed and accepted the suitability of the criteria used in the audit.

Period covered by the audit

The period covered by this audit begins with the comprehensive study carried out on the 1999 Project Millennium and ends with the 2007 Kearl Oil Sands Project joint review panel, including follow-up activities for those projects.

Audit work for this chapter was substantially completed on 30 April 2011.

Audit team

Senior Principal: Bruce Sloan
Principal: Richard Arseneault
Director: David Willey

Catherine Johns
Marc-Antoine Ladouceur

For information, please contact Communications at 613-995-3708 or 1-888-761-5953 (toll-free).

Appendix List of recommendations

The following is a list of recommendations found in Chapter 2. The number in front of the recommendation indicates the paragraph number where it appears in the chapter. The numbers in parentheses indicate the paragraph numbers where the topic is discussed.

Recommendation	Response
Information for assessing cumulative environmental effects	
<p>2.31 The Canadian Environmental Assessment Agency should assess lessons learned from previous cumulative environmental effects assessments of oil sands projects to identify good practices. These lessons learned should serve as a basis for adjusting terms of reference to proponents for future assessments of cumulative effects. (2.16–2.30)</p>	<p>Agreed. The Agency has already initiated improvements in the development of the terms of reference to proponents. This includes working with the provinces and other departments to ensure that the terms of reference to proponents take into account experience gained from previous environmental assessments. The Agency will continue to apply this approach for future projects as it strives to provide Canadians with world-class environmental assessments.</p>
<p>2.32 The Canadian Environmental Assessment Agency should review and update its guidance, including its 1999 Cumulative Effects Assessment Practitioners Guide, to take into account recent practices within Canada, including lessons learned from past assessments, as well as lessons from elsewhere regarding assessments of cumulative environmental effects. (2.16–2.30)</p>	<p>Agreed. The Agency will review its practitioner’s guidance to ensure that it reflects best practices in cumulative effects assessment from Canada and around the world. The review will focus on recent knowledge, making use of both practitioners’ experience and relevant findings from research studies. Developed for use by government and private sector practitioners, the Agency guidance will support the assessment of cumulative effects under the <i>Canadian Environmental Assessment Act</i>.</p>

Report of the Commissioner of the Environment and Sustainable Development to the House of Commons

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